

**Motoman**

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# **RM2-500/750 TX Positioner Manual**

Part Number: 147035-1CD  
Revision 0

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**MOTOMAN**  
a YASKAWA company

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# **NOTES**

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# **SECTION 1**

## **INTRODUCTION**

### **1.1 About this Document**

This manual provides instructions for the RM2-500/750 TX positioner and contains the following sections:

#### **SECTION 1 – INTRODUCTION**

General information about this manual, a list of reference documents, and customer service information.

#### **SECTION 2 – SAFETY**

Provides information for the safe use and operation of Motoman products.

#### **SECTION 3 – RM2-500/750 TX SERVICE MANUAL**

Provides detailed instructions for the RM2-500/750 TX positioner.

### **1.2 Reference to Other Documentation**

For additional information refer to the following:

- Concurrent I/O Parameters Manual (P/N 142102-1)
- Operator's Manual for General Purpose (P/N 142099-1)
- Operator's Manual for Handling (P/N 142100-1)
- Operator's Manual for Spot Welding (P/N 142101-1)
- Operator's Manual for Arc Welding (P/N 142098-1)
- Motoman UP6, XRC Manipulator Manual (P/N 142104-1)
- Motoman UP20, XRC Manipulator Manual (P/N 144342-1)
- Motoman UP50, XRC Manipulator Manual (P/N 144343-1)
- Motoman UP130, XRC Manipulator Manual (P/N 142107-1)

### **1.3 Customer Service Information**

If you are in need of technical assistance, contact the Motoman service staff at (937) 847-3200. Please have the following information ready before you call:

- Robot Type (UP6, SK16X, etc.)
- Application Type (welding, handling, etc.)
- Robot Serial Number (located on the back side of the robot arm)
- Robot Sales Order Number (located on back side of XRC controller)

## **NOTES**

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# **SECTION 2**

## **SAFETY**

### **2.1 Introduction**

**It is the purchaser's responsibility to ensure that all local, county, state, and national codes, regulations, rules, or laws relating to safety and safe operating conditions for each installation are met and followed.**

We suggest that you obtain and review a copy of the ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems. This information can be obtained from the Robotic Industries Association by requesting ANSI/RIA R15.06. The address is as follows:

**Robotic Industries Association**  
900 Victors Way  
P.O. Box 3724  
Ann Arbor, Michigan 48106  
TEL: (734) 994-6088  
FAX: (734) 994-3338

Ultimately, the best safeguard is trained personnel. The user is responsible for providing personnel who are adequately trained to operate, program, and maintain the robot cell. **The robot must not be operated by personnel who have not been trained!**

We recommend that all personnel who intend to operate, program, repair, or use the robot system be trained in an approved Motoman training course and become familiar with the proper operation of the system.

This safety section addresses the following:

- Standard Conventions (Section 2.2)
- General Safeguarding Tips (Section 2.3)
- Mechanical Safety Devices (Section 2.4)
- Installation Safety (Section 2.5)
- Programming Safety (Section 2.6)
- Operation Safety (Section 2.7)
- Maintenance Safety (Section 2.8)

## 2.2 **Standard Conventions**

This manual includes information essential to the safety of personnel and equipment. As you read through this manual, be alert to the four signal words:

- DANGER
- WARNING
- CAUTION
- NOTE

Pay particular attention to the information provided under these headings which are defined below (in descending order of severity).



### **DANGER!**

***Information appearing under the DANGER caption concerns the protection of personnel from the immediate and imminent hazards that, if not avoided, will result in immediate, serious personal injury or loss of life in addition to equipment damage.***



### **WARNING!**

***Information appearing under the WARNING caption concerns the protection of personnel and equipment from potential hazards that can result in personal injury or loss of life in addition to equipment damage.***



### **CAUTION!**

***Information appearing under the CAUTION caption concerns the protection of personnel and equipment, software, and data from hazards that can result in minor personal injury or equipment damage.***

**NOTE:**

*Information appearing in a NOTE caption provides additional information which is helpful in understanding the item being explained.*



## **2.3 General Safeguarding Tips**

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. General safeguarding tips are as follows:

- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories should be permitted to operate this robot system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the robot cell.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- In accordance with ANSI/RIA R15.06, section 6.13.4 and 6.13.5, use lockout/tagout procedures during equipment maintenance. Refer also to Section 1910.147 (29CFR, Part 1910), Occupational Safety and Health Standards for General Industry (OSHA).

## **2.4 Mechanical Safety Devices**

The safe operation of the robot, positioner, auxiliary equipment, and system is ultimately the user's responsibility. The conditions under which the equipment will be operated safely should be reviewed by the user. The user must be aware of the various national codes, ANSI/RIA R15.06 safety standards, and other local codes that may pertain to the installation and use of industrial equipment. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. The following safety measures are available:

- Safety fences and barriers
- Light curtains
- Door interlocks
- Safety mats
- Floor markings
- Warning lights

Check all safety equipment frequently for proper operation. Repair or replace any non-functioning safety equipment immediately.

## 2.5 **Installation Safety**

Safe installation is essential for protection of people and equipment. The following suggestions are intended to supplement, but not replace, existing federal, local, and state laws and regulations. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. Installation tips are as follows:

- Be sure that only qualified personnel familiar with national codes, local codes, and ANSI/RIA R15.06 safety standards are permitted to install the equipment.
- Identify the work envelope of each robot with floor markings, signs, and barriers.
- Position all controllers outside the robot work envelope.
- Whenever possible, install safety fences to protect against unauthorized entry into the work envelope.
- Eliminate areas where personnel might get trapped between a moving robot and other equipment (pinch points).
- Provide sufficient room inside the workcell to permit safe teaching and maintenance procedures.

## 2.6 **Programming Safety**

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Programming tips are as follows:

- Any modifications of the controller PLC can cause severe personal injury or death, as well as damage to the robot! Do not make any modifications to the PLC. Making any changes without the written permission of Motoman will **VOID YOUR WARRANTY!**
- Some operations require standard passwords and some require special passwords. Special passwords are for Motoman use only. **YOUR WARRANTY WILL BE VOID** if you use these special passwords.
- Back up all programs and jobs onto a floppy disk whenever program changes are made. To avoid loss of information, programs, or jobs, a backup must always be made before any service procedures are done and before any changes are made to options, accessories, or equipment.
- The concurrent I/O (Input and Output) function allows the customer to modify the internal ladder inputs and outputs for maximum robot performance. Great care must be taken when making these modifications. Double-check all modifications under every mode of robot operation to ensure that you have not created hazards or dangerous situations that may damage the robot or other parts of the system.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.

- Inspect the robot and work envelope to be sure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Be sure that all safeguards are in place.
- Check the E-STOP button on the teach pendant for proper operation before programming.
- Carry the teach pendant with you when you enter the workcell.
- Be sure that only the person holding the teach pendant enters the workcell.
- Test any new or modified program at low speed for at least one full cycle.

## **2.7 Operation Safety**

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Operation tips are as follows:

- Be sure that only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories are permitted to operate this robot system.
- Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Inspect the robot and work envelope to ensure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Ensure that all safeguards are in place.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- All modifications made to the controller will change the way the robot operates and can cause severe personal injury or death, as well as damage the robot. This includes controller parameters, ladder, and I/O (Input and Output) modifications. Check and test all changes at slow speed.

## **2.8 Maintenance Safety**

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Maintenance tips are as follows:

- Do not perform any maintenance procedures before reading and understanding the proper procedures in the appropriate manual.
- Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.
- Back up all your programs and jobs onto a floppy disk whenever program changes are made. A backup must always be made before any servicing or changes are made to options, accessories, or equipment to avoid loss of information, programs, or jobs.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- Be sure all safeguards are in place.
- Use proper replacement parts.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- All modifications made to the controller will change the way the robot operates and can cause severe personal injury or death, as well as damage the robot. This includes controller parameters, ladder, and I/O (Input and Output) modifications. Check and test all changes at slow speed.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).

# MOTOMAN XRC SERVICE MANUAL Positioner RM2-500/750 TX

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Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

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**MOTOMAN ROBOTICS EUROPE**  
A subsidiary of YASKAWA Electric Corporation

MANUAL NO. MRS54130



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**Reference list**

***Installation and Wiring of XRC cabinet  
Optional Cabinet for XRC  
Electrical drawings, see list inside document***

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**Revision**

***000905  
First release of this manual.***

***010105  
Slip ring device added.***

***010419  
Pneumatic diagram corrected.***



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# Service and installation manual

Positioner type: MOTOMAN RM2-500 TX and RM2-750 TX

## 1. About this manual

This manual shall be available to service personnel.

- ✓ Machine safety
- ✓ Installation



***For operating instruction, see Operator's Manual.***

Together with this manual, please find enclosed mechanical and electrical documentation. These documents may not be copied without our written permission and the contents thereof must not be imparted to a third party nor be used for any unauthorized purpose.

Text written in **BOLD** letters means command or button.

Text written in *ITALIC* means text shown on display.

## 2. General

### ■ ***Positioner comprises***

- ✓ Two-station horizontal positioner, type RM2-500 TX or RM2-750 TX
- ✓ Cable set between positioner and controller
- ✓ Assembly kit for XRC-controller

### ■ ***Available options***

See separate chapter for pneumatic option kits

- ✓ Controlled air +/- in fixture discs in support/drive side incl. valves
- ✓ Two air channels in fixture discs in support/drive side
- ✓ Two air channels in all fixture discs
- ✓ Signal transfer units in support side
- ✓ Fixture brackets



## 2.1 Identification



Fig.1 Identification

## 3. Safety

This machine shall be used for welding of workpiece. The machine is designed to be used together with a MOTOMAN industrial robot.

***This equipment is constructed, produced and tested according to the laws of the Member States relating to machinery (98/37/EEC) and the demands of the EMC-directives (89/336/EEC) and (93/68/EEC), as well as the LVD-directives (73/23/EEC).***



***Motoman Robotics Europe AB's responsibility does not cover errors or safety risks that may occur in equipment connected to the Motoman Robotics Europe AB machine, nor errors or safety risks that may occur in the machine caused by equipment connected to the Motoman Robotics Europe AB's machine.***

***The Motoman Robotics Europe AB machine may not be used until the complete production unit correspond to the laws of the Member States relating to machinery (98/37/EEC).***

***External cables must be connected according to our cable connection Guide included in this document.***

***The machine must only be operated by specially trained persons.***



### 3.1 Manufacturer

Address:	<b>Motoman Robotics Europe AB</b> Box 504 SE-385 25 Torsås Sweden
Telephone:	+46 486 48800
Telefax:	+46 486 41410
Machine type:	RM2-500 TX or RM2-750 TX
Machine No.:	See machine sign
Year of manufacturing:	See machine sign

## 4. Installation

### 4.1 Technical specifications

Model	RM2-500 TX	RM2-750 TX
Maximum load	2x 500 kg	2x 750 kg
Index torque	2020 Nm	3590 Nm
Index time incl. 180° fixture turning	6.4 sec	8.5 sec
Orbital torque (dynamic)	1030 Nm	1830 Nm
Orbital torque (static)	825 Nm	1470 Nm
Orbital speed	30.9 rpm	17.7 rpm
Maximum unbalance	200 kg	200 kg
Maximum offset	168 mm	199 mm
Dimension drawing	214136-xx	214060-xx

#### ■ Compressed air

Working pressure	0,6 MPa
Minimum pressure	0,5 MPa
Consumption	10 lit free air / cycle

#### ■ Welding capacity

Duty cycle 100%	700A
Duty cycle 60%	920A

#### ■ Positioning

Position accuracy	±0,1 mm
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#### ■ Colour

Frame	BLUE IT 60LDP1
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## 4.2 Lifting instruction

### ■ Using forklift

When using a forklift, the special lifting gear must be used. Even if the weight of the machine is 3.300 kg, the centre of gravity is far out i.g. a larger forklift must be used (e.g. capacity 6.000 kg).

The robot stand must be removed during transportation, but the centre beam must be mounted.

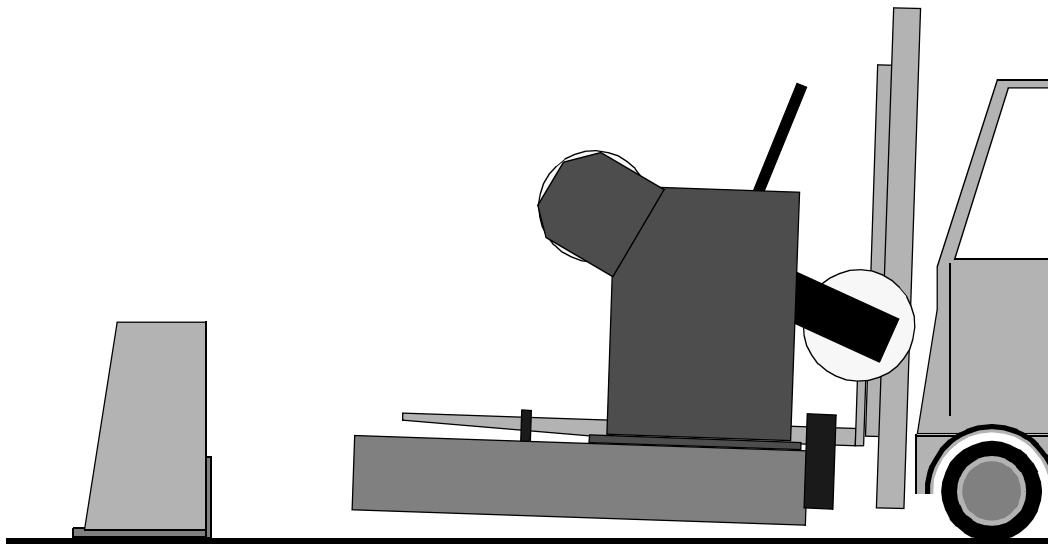
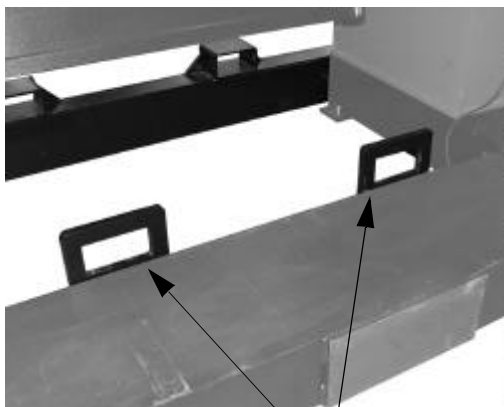
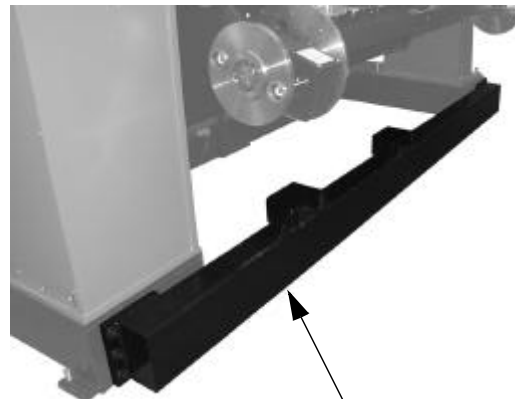


Fig.2 Lifting instruction, using forklift



P/N 314663  
M10x35 (6x)



P/N 214088-xx  
M12x35 (6x)



### ■ Using straps

When lifting the machine use straps, applied to eyebolts or shackles in applied to the footings of the stand (M24) (according to sketch).

***The straps shall be certificated for at least 4.000 kg each.***

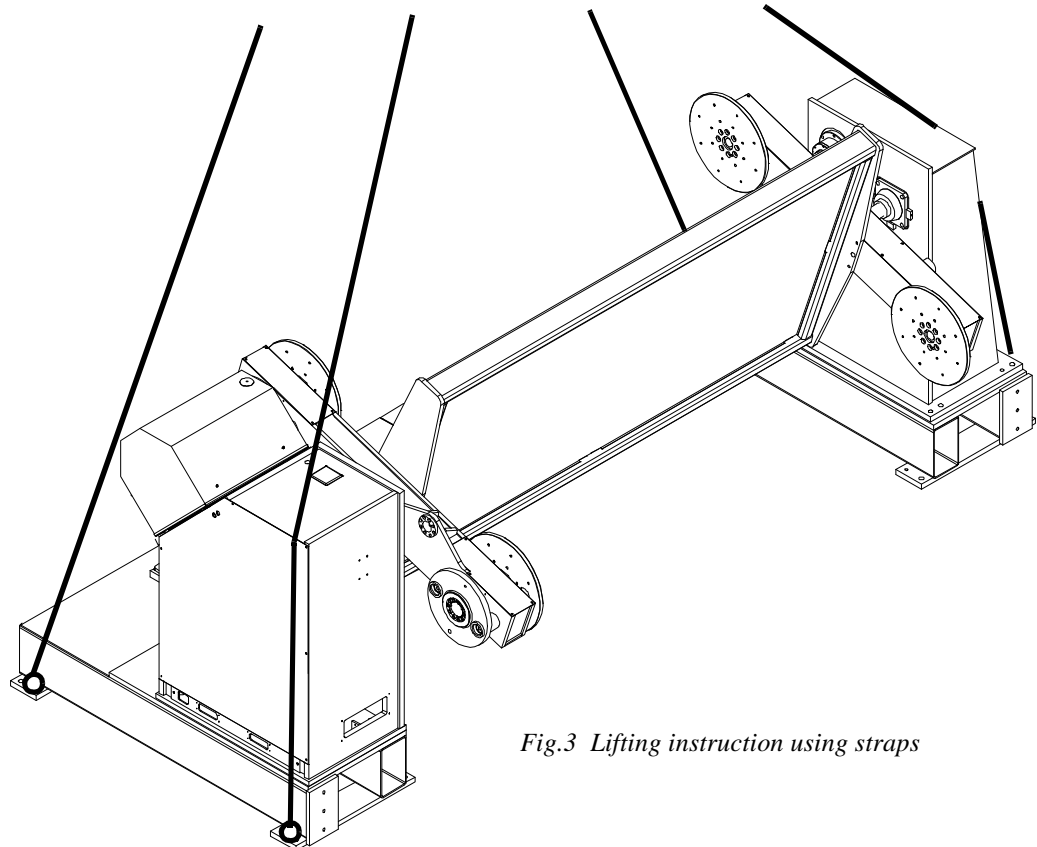


Fig.3 Lifting instruction using straps



### **Note!**

Crane operation, sling application, and forklift truck operation should be performed only by licenced personnel. In handling the positioner, extra care must be taken regarding the following:

-Never place any part of your body under a suspended load or move a suspended load over any part of another person's body. Careless handling may result in severe personal injury or death.

### **4.3 Installation safety**

Warning signs and restrictive devices such as fence, chains, safety mats or light beams must be placed around the working area of the robot / positioner. The warning signs shall indicate hazardous conditions and results that may occur if the warning is disregarded.

***Refer to the local regulation according to Machine Safety.***



### 4.4 Dimensions

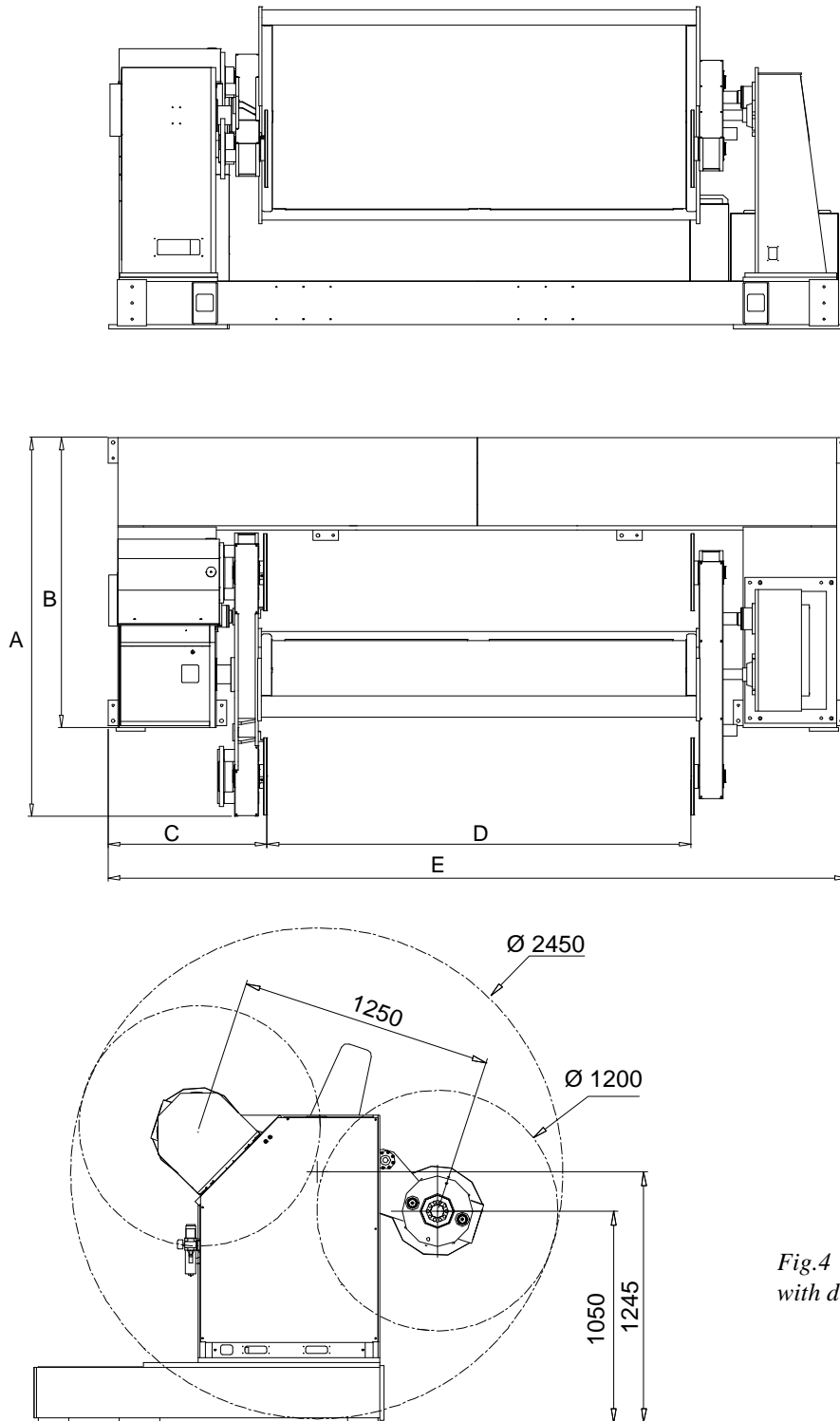


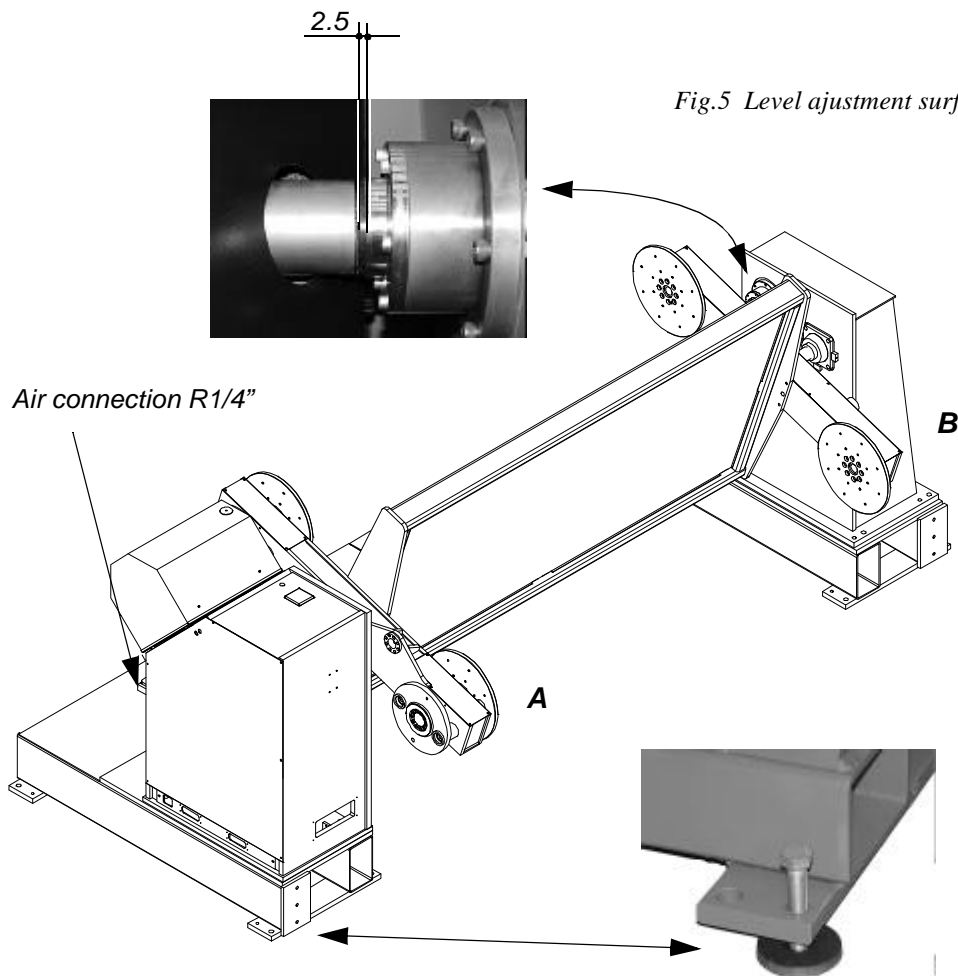
Fig.4 Main drawings with dimensions

Model	A	B	C	D	E	Weight
214060-80, 214136-80	2205	1690	936	2000	3855	3.200 kg
214060-81, 214136-81	2205	1690	936	2500	4355	3.300 kg
214060-82, 214136-82	2205	1690	936	3000	4855	3.400 kg

### 4.5 Mounting

The RM2-500/750 TX should be firmly fixed to the floor or foundation rigid enough to support the positioner and withstand repulsion forces. The surface of the floor should be level and even. If it is uneven, grind the swell and flatten the surface. The concrete thickness of the floor shall be at least 150 mm.

- a) Remove lifting gear before leveling.
- b) Place a spirit-level on the surfaces **A** and **B** resp. Adjust the level with the screws in both ends of the bed to a level  $<0,2/1000$  mm.
- c) Adjust the screws in the middle of the bed. Use footing washer underneath each bolt.
- d) Fix the bed to the floor. Use anchor bolts according to the holes in the stand.
- e) Remove shipping bolt placed at the main gear wheel.
- f) Check distance between swing and locking cylinder. Must be 2.5 mm. Adjust if necessary.



## 4.6 Connection to air supply

Connect to main supply of compressed air (The air shall be clean and dry.) See pneumatic scheme No. 213657, at the end of this manual.

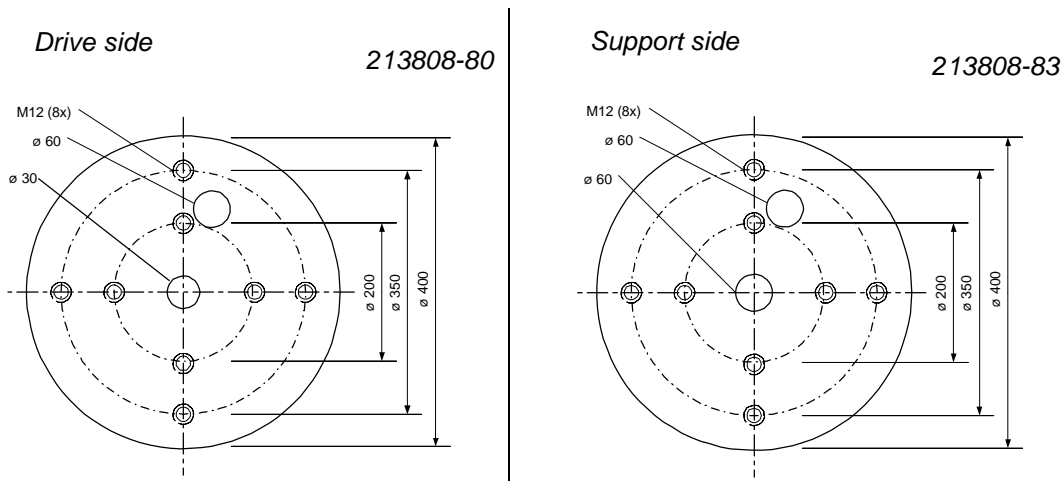


### Note!

Be careful when opening the main valve for the first time, cylinders may do unexpected motions.

## 4.7 Fixture discs

The RM2-positioner can be equipped with different versions of fixture discs. The discs of drive side and support side may look different depending on preparation for different options.



### ■ Fixture bracket

Optional brackets for mounting of fixtures are available. Fixture brackets are delivered in pairs.

One pair contains one complete set, one for the drive side and one for the support side.



213811-81

231811-80



## 4.8 Maximum load

To guarantee long and safe operation with high positioning accuracy of the RM2-500/750 TX, the machine must not be overloaded.

Follow restrictions below:

### ■ RM2-500 TX

Maximum static torque of servo axis = 825 Nm.

Maximum payload = 500 kg (incl. fixtures).

Maximum offset from rotation centre at 500 kg = 0.168 m

### ■ RM2-750 TX

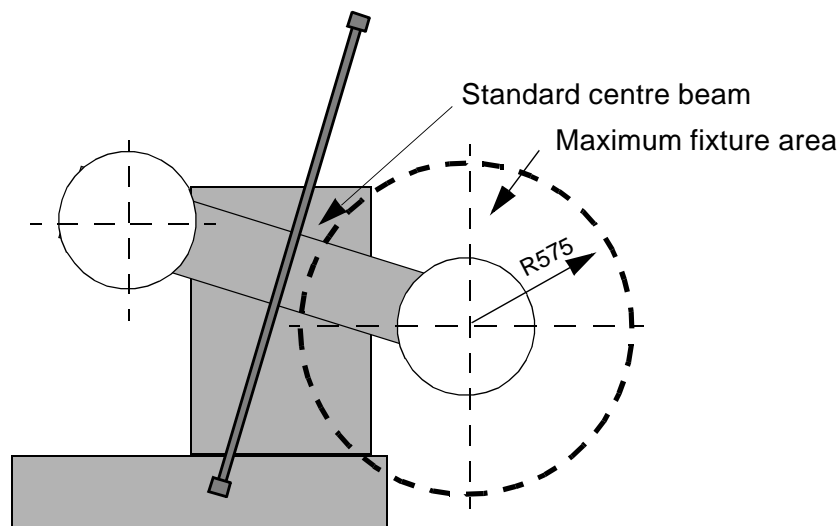
Maximum static torque of servo axis = 1470 Nm.

Maximum payload = 750 kg (incl. fixtures).

Maximum offset from rotation centre at 750 kg = 0.199 m

$$\frac{825}{500 \times 9.81} = 0.168 \text{ m}$$

$$\frac{1470}{750 \times 9.81} = 0.199 \text{ m}$$



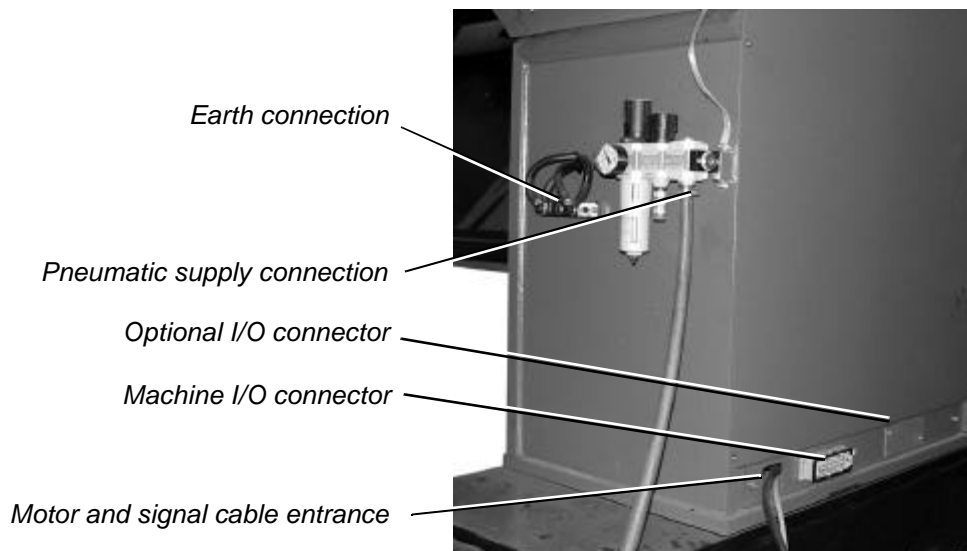
## 4.9 Connection to MOTOMAN XRC

Installation and connection to XRC comprises hardware as well as software installation, this moment shall be carried out by MOTOMAN-service personnel.

When the RM2 is delivered together with a robot, this installation is already carried out at MOTOMAN factory.

See separate scheme, included in this documentation, for electrical connection.

✓ Internal wiring I/O-signals, PNP	347358-95
✓ Internal wiring I/O-signals, NPN (US-version)	347358-97
✓ Servo motor power transfer; SIGMA	347271-xx
✓ Servo motor signal transfer; SIGMA	347269-xx
✓ Servo motor power transfer; USADED	341923-xx
✓ Servo motor signal transfer; USADED	341920-xx
✓ I/O transfer cable (option)	347339-xx



### Note!

Install all electrical cables connecting the positioner, controller, welding machine, and electrical supply wiring cables so that there is no possibility of their being walked on or run over. Do not put any object directly on the cables.

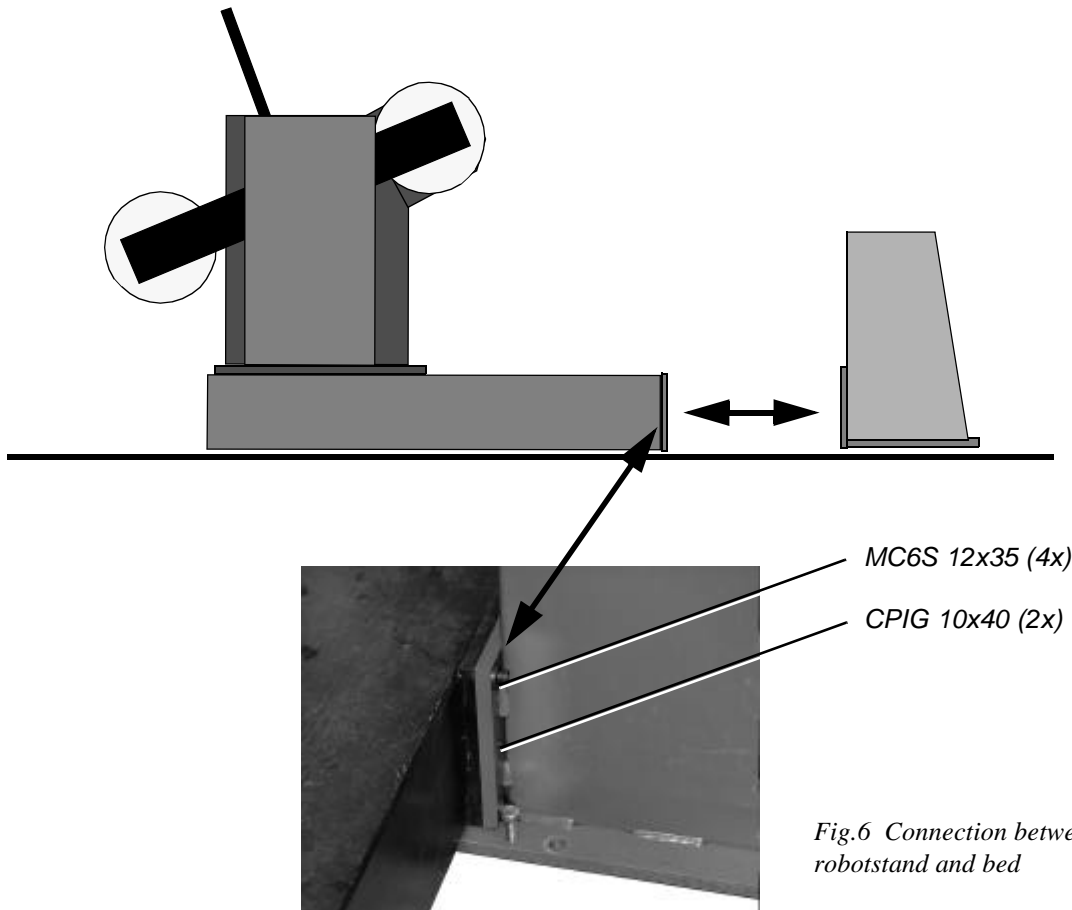


Do not install cables across other cables, and do not lay cables underneath the welding machine.

The positioner is controlled from the robot controller / operator's panel. Install these so that the positioner is in full view from the controller.

### 4.10 Connect to robotstand

The RM2-500/750 TX can be made for single, twin or tripple robot operation.  
 The robotstand is fixed to the machine bed by means of four bolts.  
 The position of the robotstand is decided when setting up the station. The connection plate is welded in position after try-out.  
 This solution makes it possible to take apart and mount again without loosing reference points.



*Fig.6 Connection between robotstand and bed*



#### 4.11 Before first start

Before starting the operation, the safety fence, shield screens, cover and protective devices must be connected.

Personnel should be instructed to stay outside the robot / positioner work area.

##### ■ **Lifting gear**

Remove lifting gear before taking into operation. If machine is operated without removing lifting gear, an obvious risk to damage the fixtures occurs.

##### ■ **Shipping bolt**

Remove the shipping bolt which stops the motor carriage from sliding back and forth.

Remove lifting gear before taking into operation.



##### ■ **Function control**



##### **Warning!**

Check all safety functions emergency stop buttons etc. Failure to do so could result in serious personal injury or death.

Radio Frequency Interference (RFI) and Electromagnetic Interference (EMI) may cause unexpected positioner motion which may result in severe personal injury or death.

If RFI or EMI are suspected, contact an electrical noise consultant.

During operation, check the positioner for excessive vibration, unusual noise etc. If any of these occur, stop immediately by pushing **EMERGENCY STOP** button on the operator's panel, and contact MOTOMAN-Service.



## 5. Maintenance

### 5.1 General

Maintenance of the positioner should be handled only by authorized personnel or MOTOMAN-Service, who are thoroughly familiar with the design and construction of the system.

Before performing maintenance or service work, be sure to:

- a) Turn off and lock the electrical supplies.
- b) Lock the wiring circuit breaker.



#### **Warning**

Due to possible interconnections of the positioner controller with other equipment, more than one live circuit can exist. Be sure you have turned off all live circuits before servicing.

In order to prevent inadvertent turning on of the machine, post a warning or danger notice on the disconnected main switch, indicating that maintenance is performed.

After completing maintenance work, be sure to check that all the cover clamping bolts are tight and that no tools are left in the interior of the working cell.

### 5.2 CYCLO reduction gears

#### **Condition at delivery**

The reduction units are filled with grease and ready for operation.

#### **Mounting of motor**

For reduction units with a hollow input sleeve the motor shaft should be coated with MoS<sub>2</sub>-paste or spray (e.g. Molycote).

#### **Overhaul**

After about 20.000 hours or 4 to 5 years operation, it is advisable to overhaul the unit and replace the grease.

#### **Disassembly - reassemble**

In principle, disassembly of the reduction unit is not recommended. No attempt should be made to change the mesh or clearances within the unit. If the unit is disassembled by other than CYCLO personnel then the operating and performance characteristic cannot be guaranteed.

#### **Lubrication**

The series CYCLO F2C-T55 are grease lubricated for life and can be mounted in any position. Standard reduction units are filled with Optimol Longtime PD0, routine regreasing is not necessary.



### 5.3 Guide blocks

The RM2-500/750 TX servo motor unit is mounted on guide blocks and rails. Two brands of guide blocks may be used: INA or STAR.



#### **NOTE!**

The two brands can not be mixed, always check which type of guide block that is mounted on the machine! Stated on the product by type or company name.

### 5.4 Fixing hubs, type F and G

Friction locking assemblies shall be mounted slightly oiled. To increase torque by approx. 15%, make a dry mounting by drying the internal and external surface of the locking assembly itself by with a cloth.

#### **Mounting**

In order to obtain high performance the right torque must be set, use a dynamometric wrench. This operation shall be carried out gradually. The friction locking assemblies are self centring.

Torque for F 70/110	83 Nm
Torque for G 100/145	145 Nm

#### **Dismantling**

Take off as many screws as the extracting holes are and tighten them again in the latter.

### 5.5 Cleaning

The machine does not need any special cleaning beside normal cleaning once a shift (dust etc.). Inspection of the guide rails must be carried out on regular basis. Keep an eye on the current transfer discs. If the surface is too worn, bad contact and bad welding result will occur.

### 5.6 Pneumatic equipment

Check the air-treatment unit regularly, empty the filter bowl.  
See, separate pneumatic scheme.

#### **Pneumatic valve**

FESTO CPE, double solenoid valve. The valve is actuated by means of alternate switching of the voltage supply to the solenoid coils, and retains its switched position, even after the signal is removed, until a counter-signal is received.

The valve can be run with lubricated or unlubricated air.

Operating pressure 0,3 up to 0,8 MPa.

Coil: 24 V, 1 W

Flow rate: 750 l/min.

Ambient temperature -10°C up to +50°C.

#### **Option**

Extra pneumatic valves may be mounted in the RM2-positoner used for controlling the fixtures.



## 5.7 AC servo

### **Servomotor**

The AC servomotor has no wearing parts (e.g. brushes), so simple daily inspection is sufficient. The inspection schedule for the motor is shown in table.

Do not disassemble the motor. If disassembly should become necessary, contact MOTOMAN-service.

### **Servopack**

The servopack does not require any special maintenance. Remove dust and tighten screws periodically.

### **Maintenance**

Inspection item	Frequency	Inspection operation
Vibration	Daily	Feel manually
Noise	Daily	Aurally
Exterior and cleaning	As required	Clean with dry cloth or compressed air
Insulation resistance	Annually	Make sure that it is more than 10 Mohm by measuring with a 500V megger after disconnection the motor from the controller
Shaft seal	Every 5.000 h	Replace shaft seal
Overhaul	Every 20.000 hours or 5 years	If worn or damaged, replace after disconnecting the motor from the machine. Contact MOTOMAN-service.

### **Troubleshooting**

Trouble	Cause	Remedy
Motor does not start	Loose connection	Tighten connection
	Wrong wiring	Correct wiring
	Overload	Reduce load
Unstable operation	Wrong wiring	Inspect and correct wiring across motor terminals L1, L2, L3 and PE
Motor overheats	Excessive ambient temperature	Reduce ambient temperature below 40°C
	Motor surface is dirty	Clean motor surface
	Overload	Reduce load



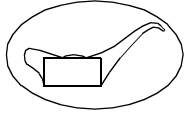
Trouble	Cause	Remedy
Unusual noise	Motor loosely mounted	Tighten foundation bolts
	Motor misaligned	Realign
	Coupling out of balance	Balance coupling
	Noisy bearing	Check alignment, noise of bearing, lubrication and contact MOTOMAN-service
	Vibration of driven machine	Contact machine manufacturer, MOTOMAN-service

**NOTE!**

***Shaded text, remedies should be carried out after turning power OFF.***



## 5.8 Lubrication scheme



This symbol indicates a location to perform inspection or maintenance according to the list below.

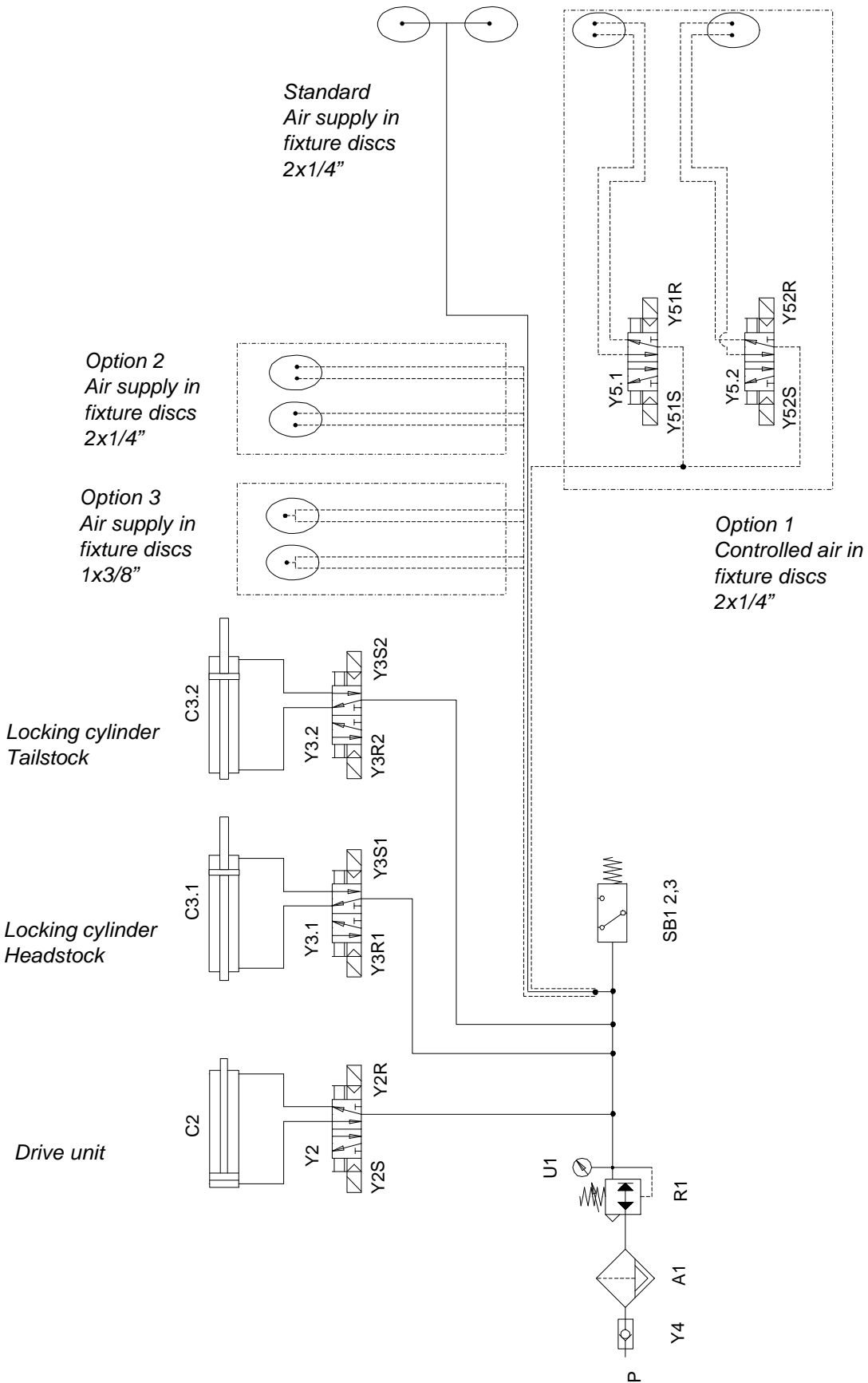
Interval	Point	Method	Lubricant
--	Bearing, permanently lubricated	--	
Weekly	Pneumatic system Check filter bowl	Empty if necessary	
	Security Check bolts for fixtures and anchor bolts.	Visually, wrench key	
	**) Visual inspection of the rails. Particles in the welding fumes in combination with grease leaves brown coating on the rail. If these brown coatings appear they have to be removed and the lubrication interval shortened.		
500 h	Current transfer disc Check for worn surfaces	Visually	
	Rotary stud	Manually with a brush	Klüber Microlube GL-261
	Gear* If the cycle time is shorter than 2 minutes, grease every 15.000 indexes.	Grease gun	20 gram Klüber grafloscon C-SG 0 PLUS
	Cables and hoses Check wear and condition	Visually	
	Locking cylinder	Manually with a brush	Klüber Microlube GL-261
	Hub for locking cylinder	Manually with a brush	Klüber Microlube GL-261
	Carriages, (four) Size 35. Amount of grease for each carriage = 2.0 cm <sup>3</sup>	Grease gun	Klüber Microlube GL-261
	Plunger for locking of fixture discs Inside swing	Grease gun	Klüber Microlube GL-261
Replacing	Reduction gear The gear is lubricated at delivery. No need to lubricate before putting into service.		SHELL Alvania RA
20.000 h	Reduction gear, overhaul See separate instruction		

\*) See lubrication note, mounted on the cover.

\*\*) If no coating can be seen, the inspection interval can be increased.



### 5.9 Pneumatic diagram





### ■ *Pneumatic options*

Following options are available for the RM2-500/750 TX positioner.

Option	Description	Option P/N
Standard	Drive side = Air supply 1x1/4" in each disc	-
Option 1	Support/drive side = Controlled air 2x1/4" in each disc	314281
Option 2	Support/drive side = Air supply 2x1/4" in each disc	314281-81
Option 3	Support/drive side = Air supply 1x3/8" in each disc	314402
Option 4	Support side = Signal transfer device, endless rotation 2-channels for bus communication	314725-80



#### **Note!**

Adding any of the options 1, 2 or 3 on the drive side enables the standard air supply on the drive side.

Only one of the options 1, 2, 3, 4, 5 or 6 may be used at the same time (on each side).





## 6. Spare parts

Guarantee and machine function is valid only when using original Motoman spare parts. Using defect parts in the machine may result in severe accidents.

When ordering spare parts, always state:

- ✓ Machine type
- ✓ Machine No.
- ✓ Part No.
- ✓ Part name.
- ✓ Number of parts.

However, it is always advisable to keep some of the most frequent spare parts in stock, close to the machine.

For RM2-500/750 TX the following parts are recommended:

<u>Name</u>		<u>Part No.</u>	<u>No. of p.</u>
Magnet valve	CPE-18-MIH	7027083	1
Limit switch	XCK-M102	8410010	1
Limit switch	XCK-J767	8410026	1
Carbon brush	R=42,5	414071	6
Grease Klüber	Grafloscon	9100551	1

If there are several indexing equipment of the same kind in the factory it is advisable to keep following parts in stock.

### ***Send your order to:***

Address:

**Motoman Robotics Europe AB**

P.O. Box 504

SE-385 25 Torsås

Sweden

Telephone:

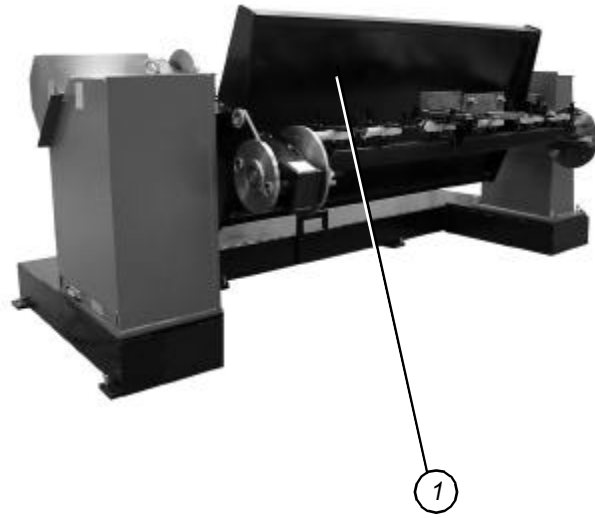
+46 486 48800

Telefax:

+46 486 41410

***Or nearest Motoman dealer.....***

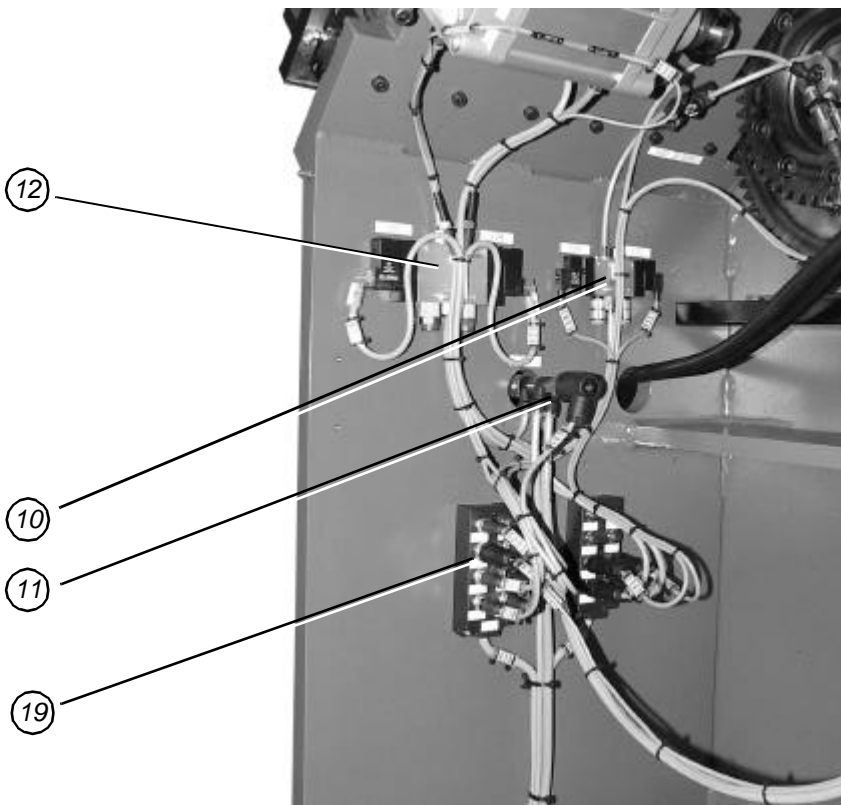
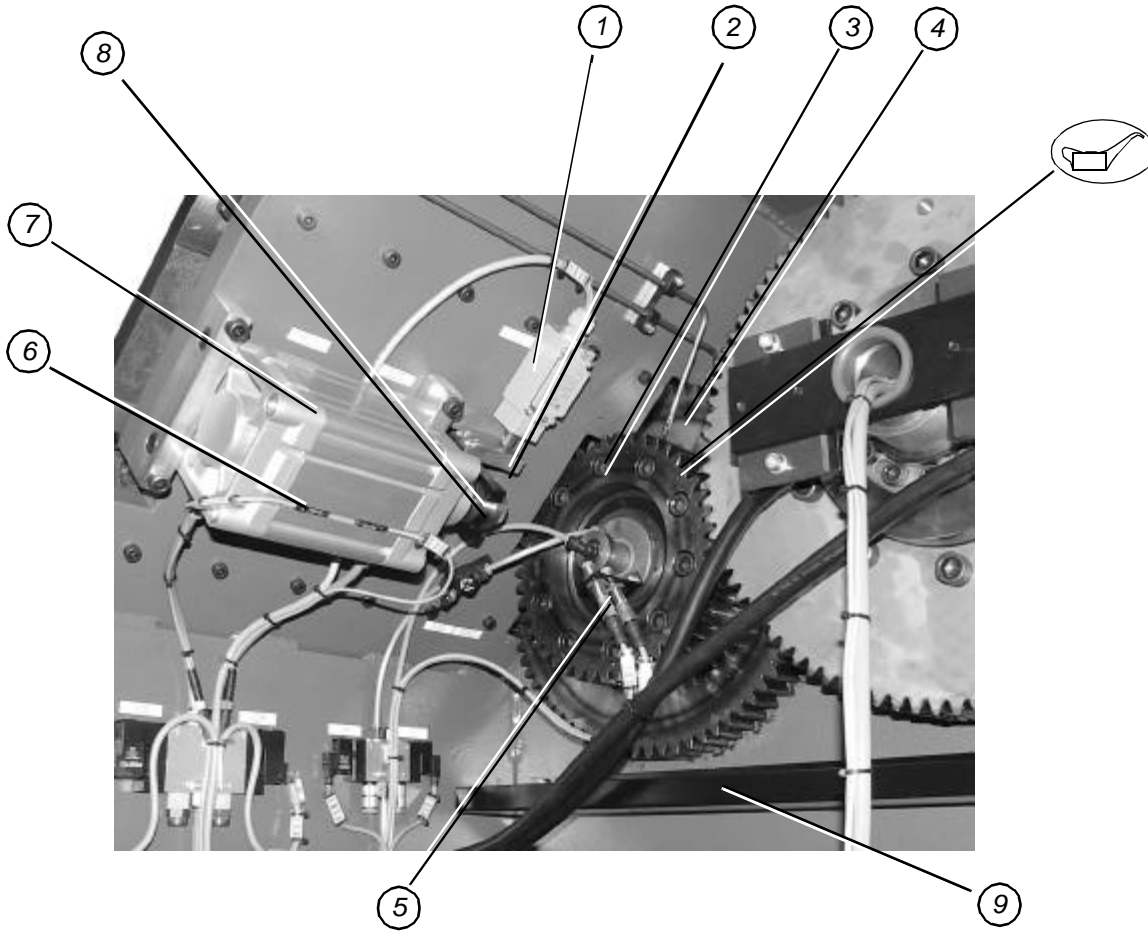
■ Covers



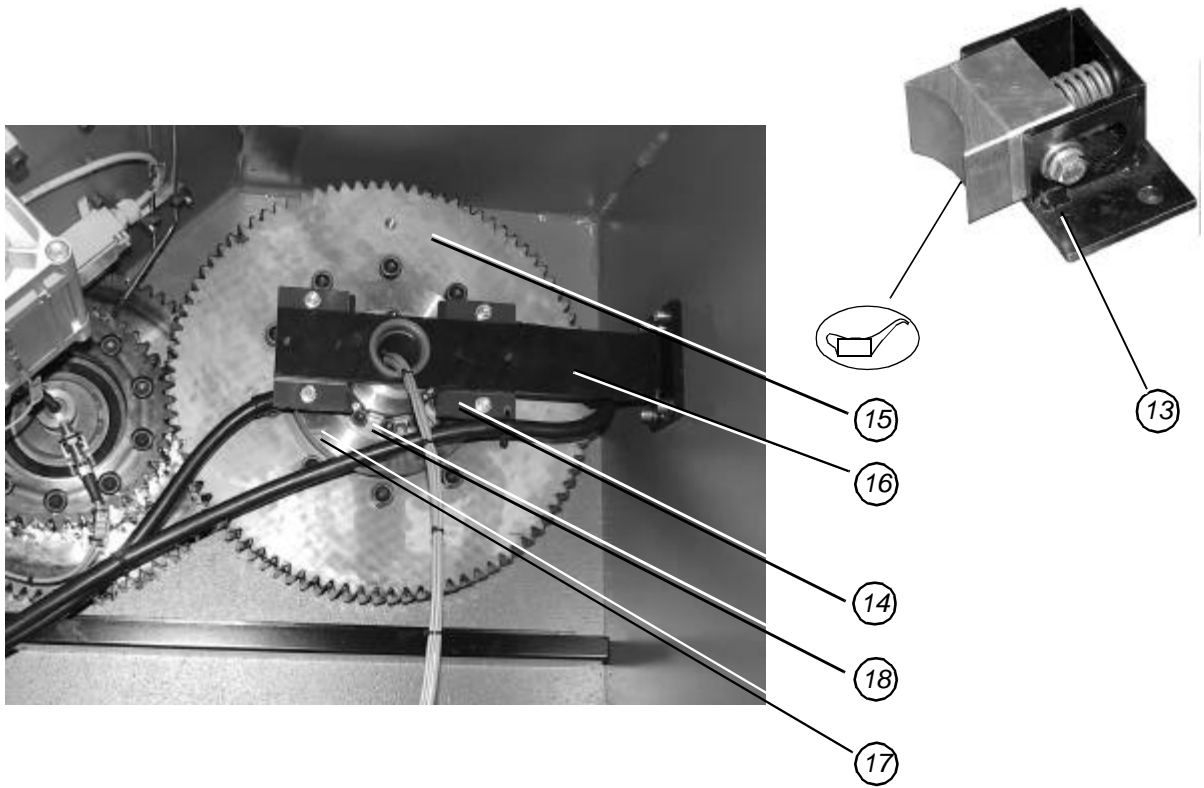


Pos. No	Part No.	Description	Note
1	214135-xx	Centre beam	-80, L=2000 -81, L=2500 -82, L=3000
2	113636	Hood	
3	214063	Cover	
4	214088-xx	Lifting gear	-80, L=2000 -81, L=2500 -82, L=3000
5	013090-xx	Machine bed	-80, L=2000 -81, L=2500 -82, L=3000
6	313824	Lid	

■ Drive unit, gear

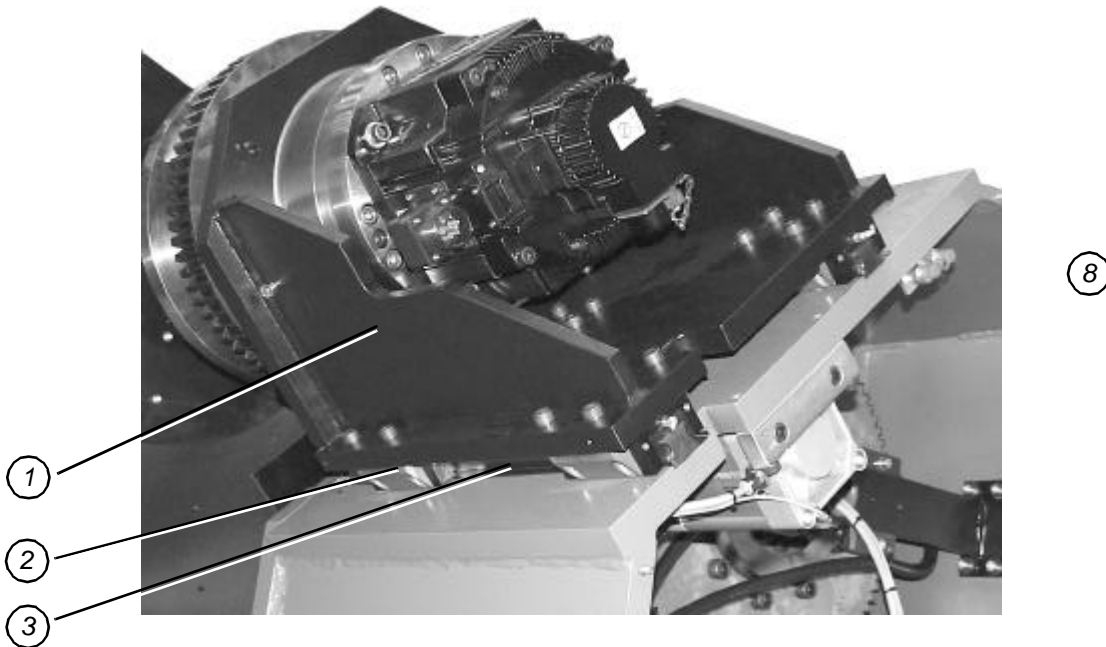
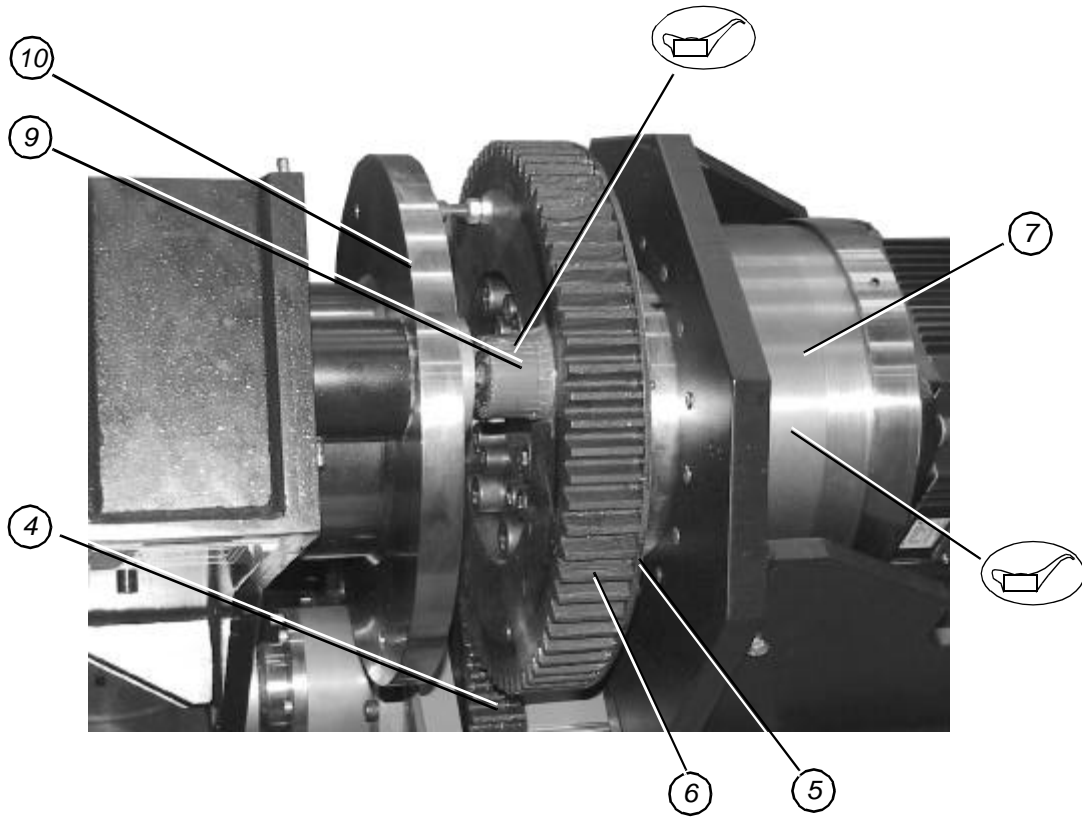






Pos. No	Part No.	Description	Note	Ref.
1	8410026	Limit switch		1S2S
2	414136	Shoulder		
3	314156	Gear wheel		
4	213746	Gear wheel		
5	8411048	Proximity switch	PNP	S3S2 / S3SR
	8411049		NPN (US-version)	
6	7028141	Proximity switch	SME-8-S-LED-24	S2R / S2S
7	7028141	Cylinder	DNC-100-50-PPV-A	C1
8	413954	Dog		
9	213714	Funnel		
10	7027081	Pneumatic valve	CPE-14-M1H-5J-1/8	Y3S1 / Y3R1
11	8413022	Pressure switch		SB1
12	7027083	Pneumatic valve	CPE-18-M1H-5J-1/4	Y2S / Y2R
13	313528-83	Earth connection	Complete, R=42,5	
14	313707	Insulation plate		
15	213745	Gear wheel		
16	213910	Bracket		
17	314159	Hub		
18	6046856	Fixing hub	G 100/145	
19	8411213	Connection box	PNP	X10 / X11
	8411223		NPN (US-version)	

■ Headstock, drive unit



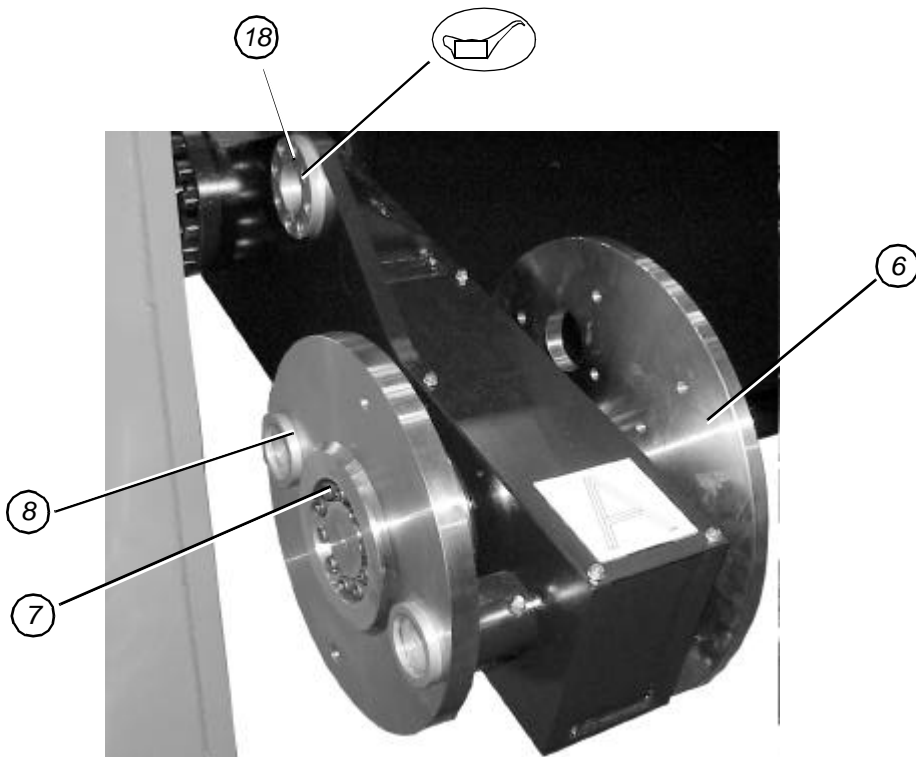
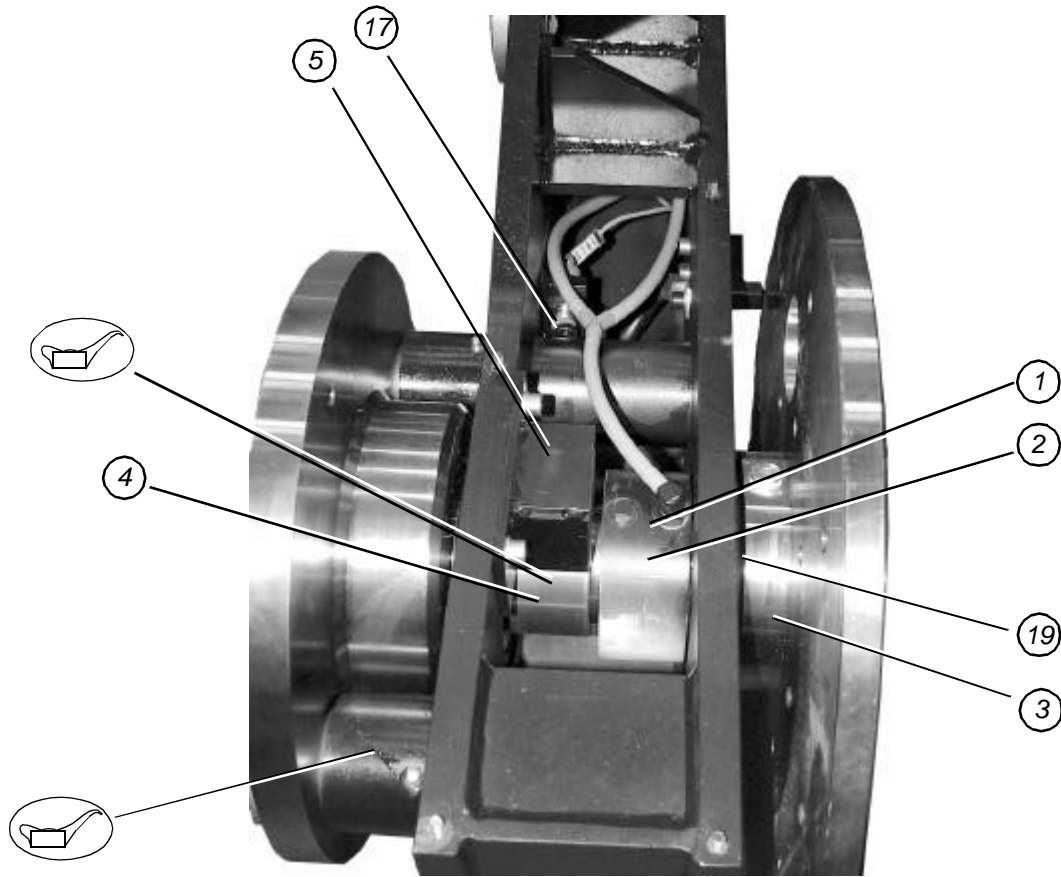


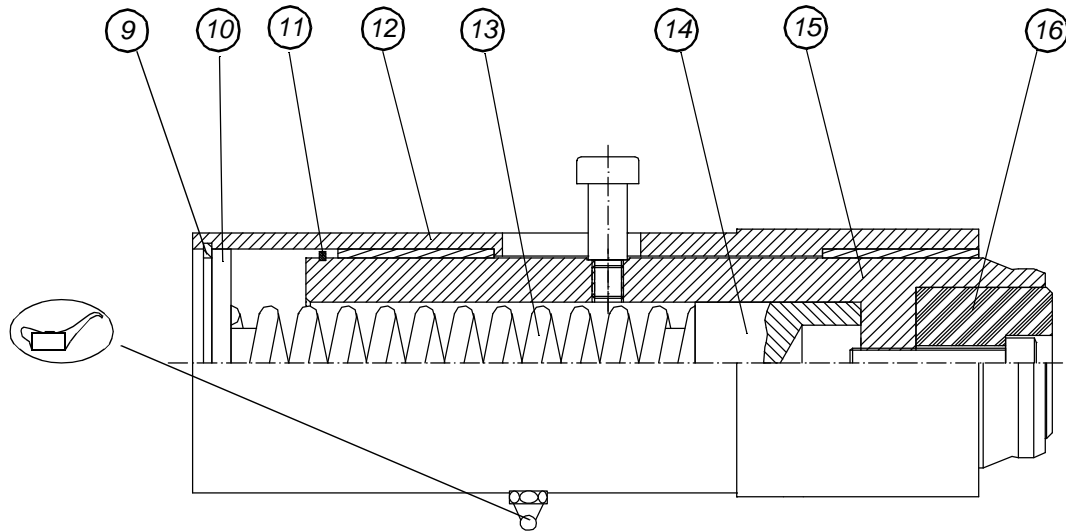
Pos. No	Part No.	Description	Note	Ref.
1	113633	Motor bracket		
2*	6045239	Guide block	INA:KWVE 35V1G4	
	6045139		STAR:1651-314-10	
3*	6045295	Rail	INA: THVD35V-474-37/37	
	6045195		STAR:1607-304-31,474	
4	213528	Gear wheel		
5	314472	Safety disc		
6	213747	Gear wheel		
7	113828-90	Servo drive unit	SGMDH-32A2A-YR32, F2C-T55-81	RM2-500
	113828-92	Servo drive unit	SGMDH-32A2A-YR32, F2C-T55-141	RM2-750
8	414122	Indicator		
9	413952	Stud		
10	313579	Index disc		

**\*) Note!**

STAR and INA components may not be mixed. However, they are fully interchangeable.

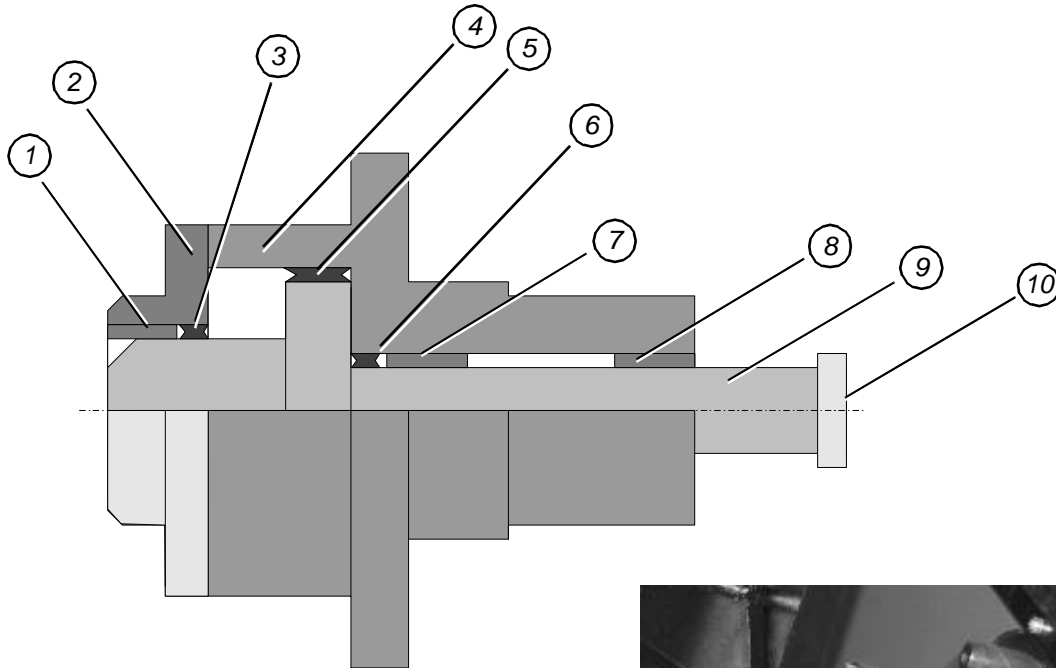
■ **Headbeam**





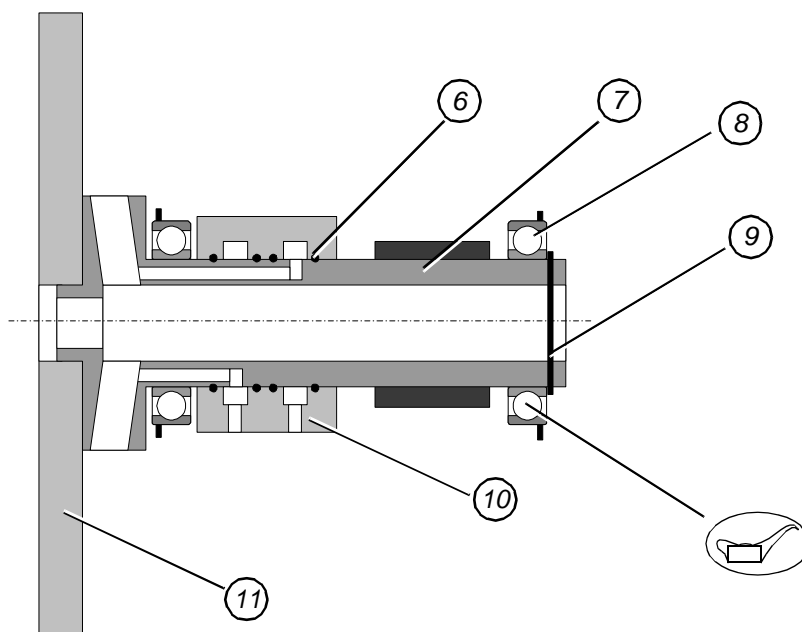
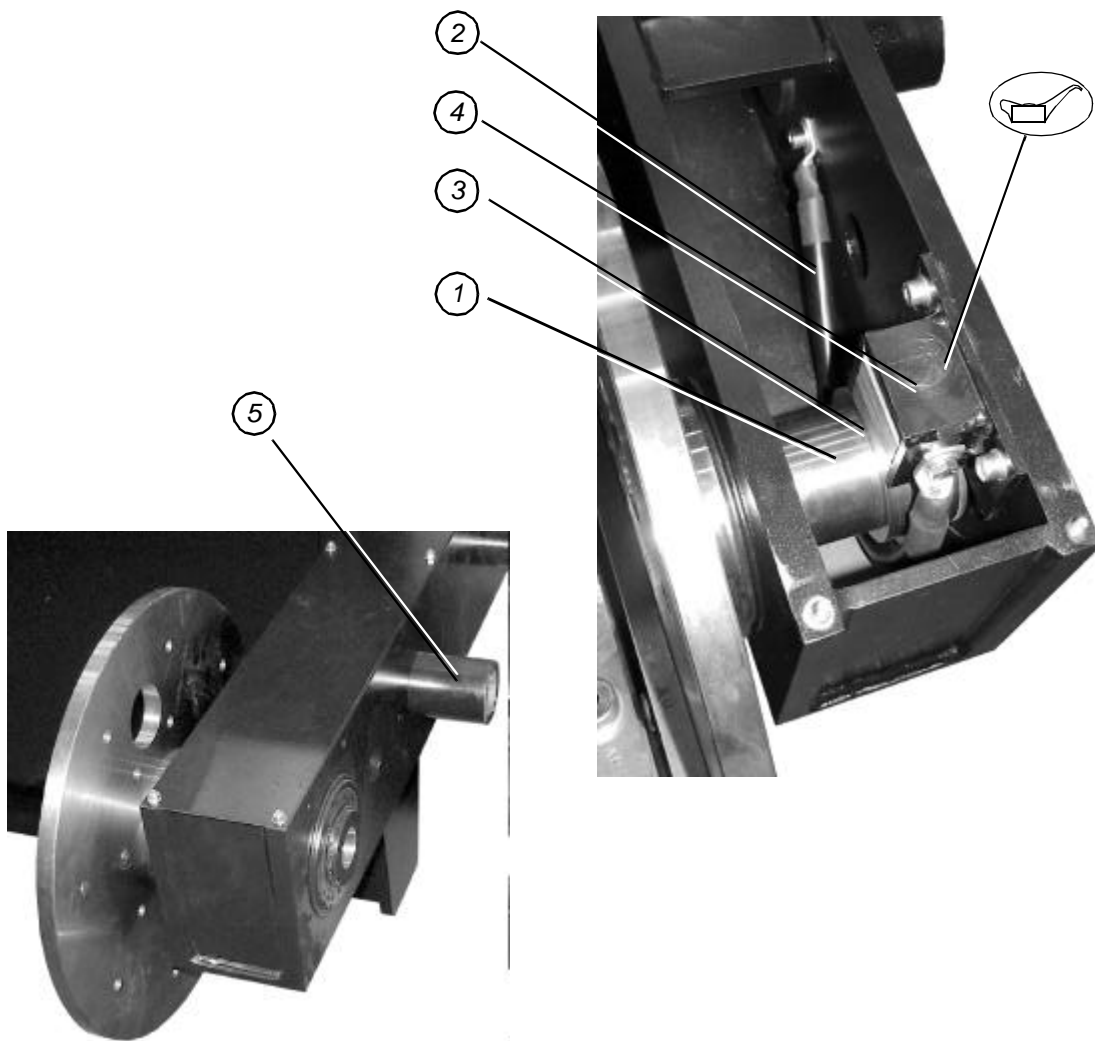
Pos. No	Part No.	Description	Note	Ref.
1	314162	Sleeve		
2	6017226	O-ring	69,5x3.0 Nitril	
3	213749	Shaft		
4	414070	Current transfer ring		
5	313528-83	Earth connection	Complete , R=42,5	
6	213808-80	Fixture disc	Standard	
7	6046837	Fixing hub	F 70/110	
8	413157	Bushing		
9	6015439	Locking ring	SGH60	
10	413152	Cover		
11	6015439	Locking ring	SW55	
12	313176	Housing		
13	6034080	Spring	TF 5x20x130	
14	413154	Spacer		
15	313177-81	Plunger		
16	413953	Sliding heel		
17	8411044	Proximity switch		S1RA / S1RB
18	313774	Bushing		
19	6040903	Ball bearing	6214-2ZNR	

■ Locking cylinder



Pos. No	Part No.	Description	Note
1	413771	Bearing	
2	213523	Lid	
3	6052955	Sealing	PNIP 50x60x7
4	113452	Housing	
5	6052920	Sealing	PDA 88x100xA01
6	6052950	Sealing	PNIP 30x40x7
7	6054036	Bearing	777 ø30/40x30
8	6054036	Bearing	777 ø30/40x30
9	213524	Shaft	
10	7003063	Sleeve	8x4

■ Tailstock



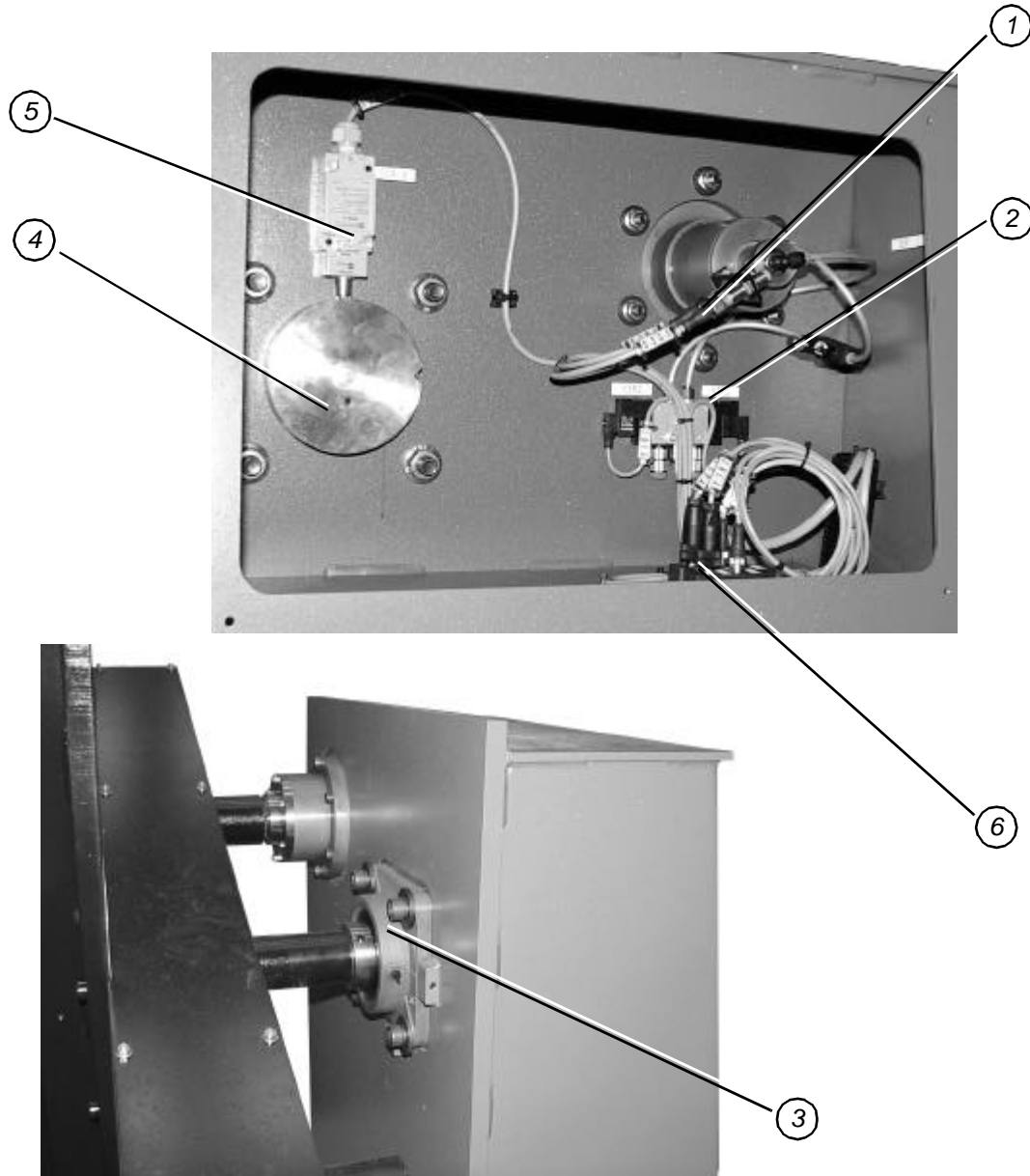


Pos. No	Part No.	Description	Note	Ref.
1	214051-80	Shaft	Standard	
2	313736	Earth cable		
3	414070	Current transfer ring		
4	313528-83	Current transfer	Complete, R=42,5	
5	313791	Bushing		
6	6017226	O-ring	69.5x3.0 Nitril	
7	-	Shaft	Option	
8	6040903	Ball bearing	6214-2Z NR	
9	6015057	Clip	SGA 70	
10	314162	Sleeve		
11	213808-83	Fixture disc	Standard	



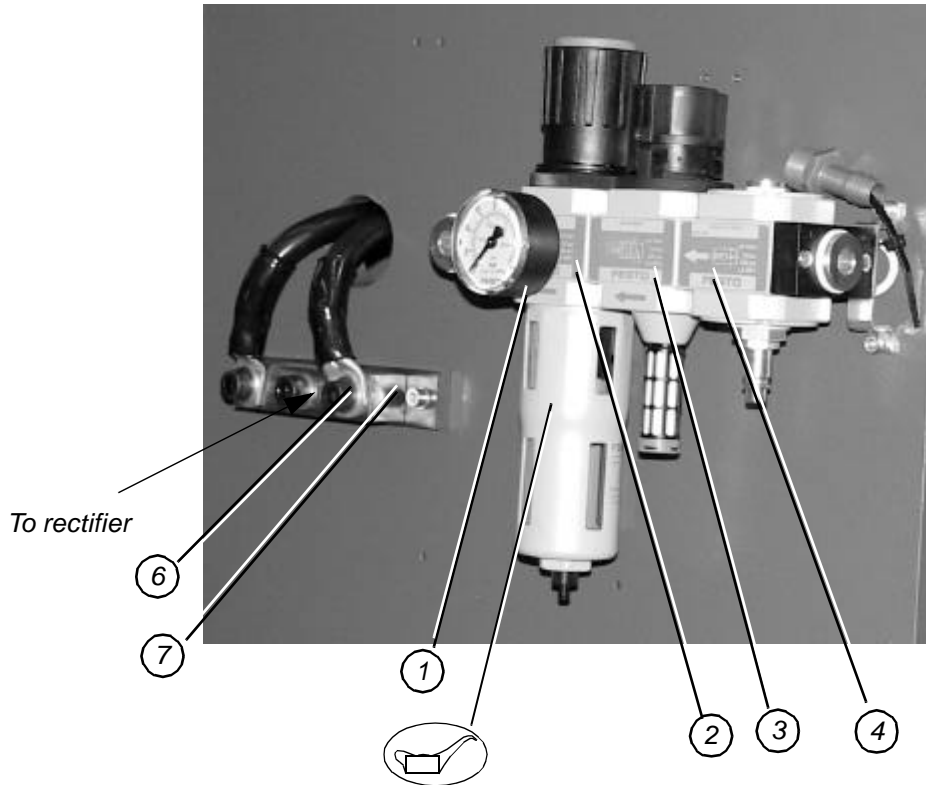


Support



Pos. No	Part No.	Description	Note	Ref.
1	8411048	Proximity switch	PNP	S3R1 / S3S1
	8411049		NPN (US-version)	
2	7027081	Pneumatic valve	CPE-14-M1H-5J-1/8	Y3R2 / Y3S2
3	6070028	Bearing	FY 60 TF	
4	313844	Cam disc		
5	8410026	Limit switch	XCK-J767	SLA/B
6	8411091	Connection box	PNP	X12
	8411221		NPN (US-version)	

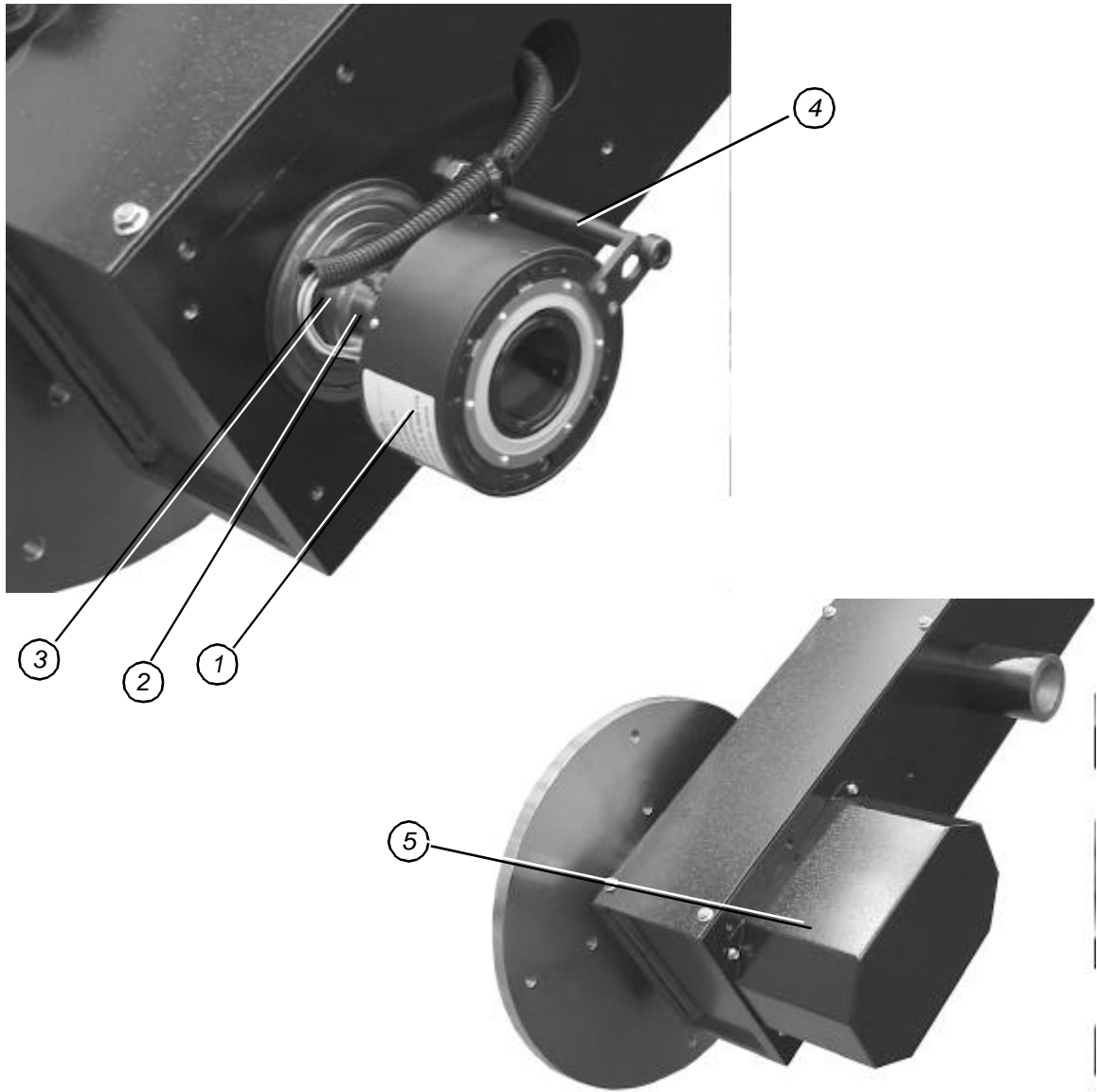
### ■ Air cleaning unit



Pos. No	Part No.	Description	Note
1	7006051	Pressure gauge	
2	-	Air filtre regulator	LRF-D-MIDI
3	-	Valve	HE-D-MIDI
4	-	Non-return valve	FRM-H-D-MIDI
	7027930	Complete service unit	Incl. pos 1-4
6	413951	Connection block	
7	314034	Insulation plate	



■ Signal transfer, Litton



Pos.	Part.No.	Description	Note
1	8291010	Slip ring device, Litton	12-channel / Bus comm.
	8291012		24-channel
2	314741	Shaft	
3	213492-82	Shaft	
4	6002056	Bolt	M8x70
5	314750-80	Cover	for 12-channel device
	314750-81	Cover	for 24-channel device



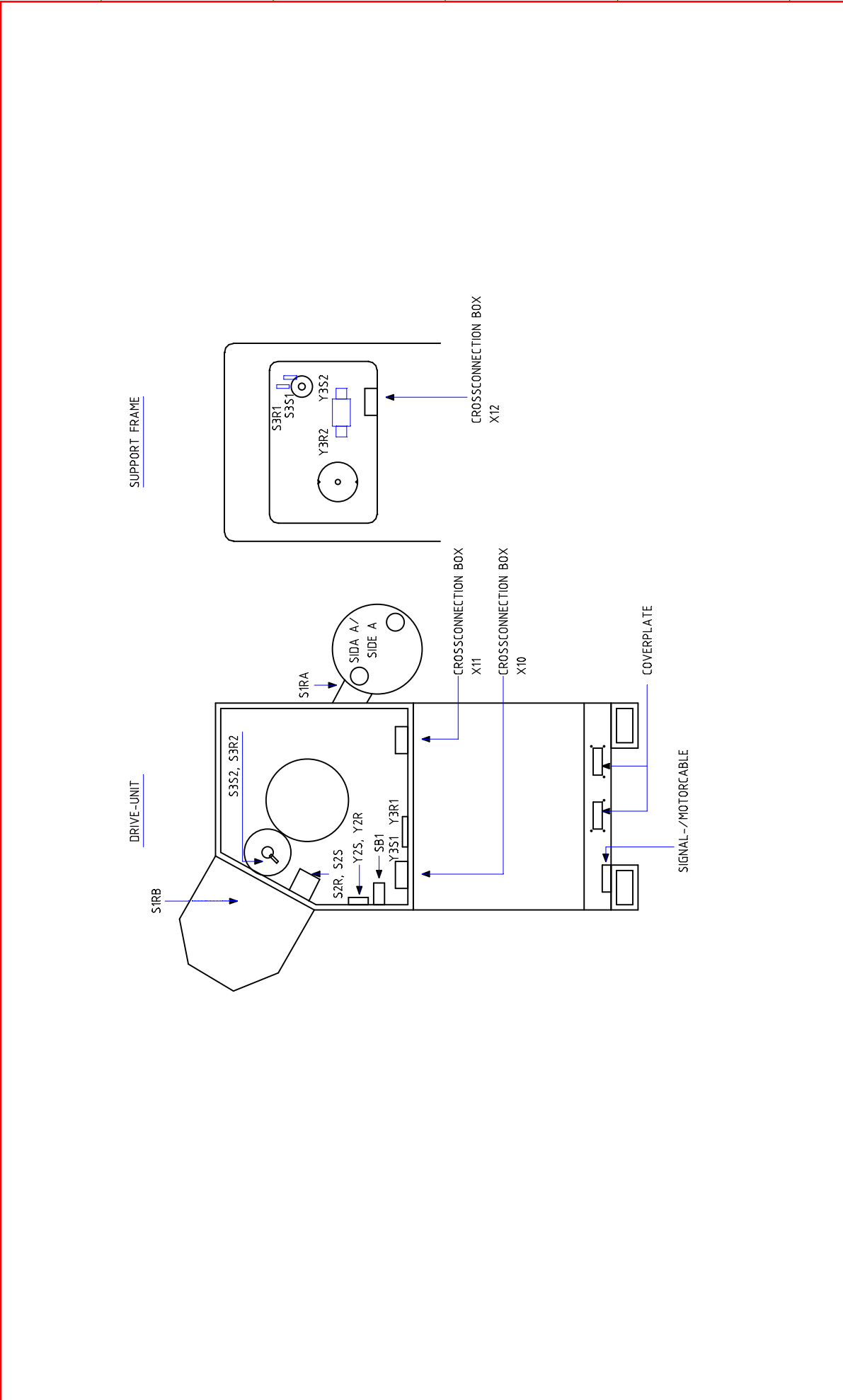
# *Notes*

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Partyp RK	om ej annat anges.
Kabelarea 0.75mm <sup>2</sup>	om ej annat anges.
Kabeltyp Øflex	om ej annat anges.

REV	REV. ANSER	DATE	DATUM
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MOTOMAN SWEDEN			
DIT BEGÄRN	SE	KONSTR. DESIGN	MM
GODK. APPR.		DATUM DATE	000323
ORDER NR.		REV	
ORDER NO.			

RM2-500/750SX USA VERSION			
KUND/CUSTOMER		E347358-97.PRO	

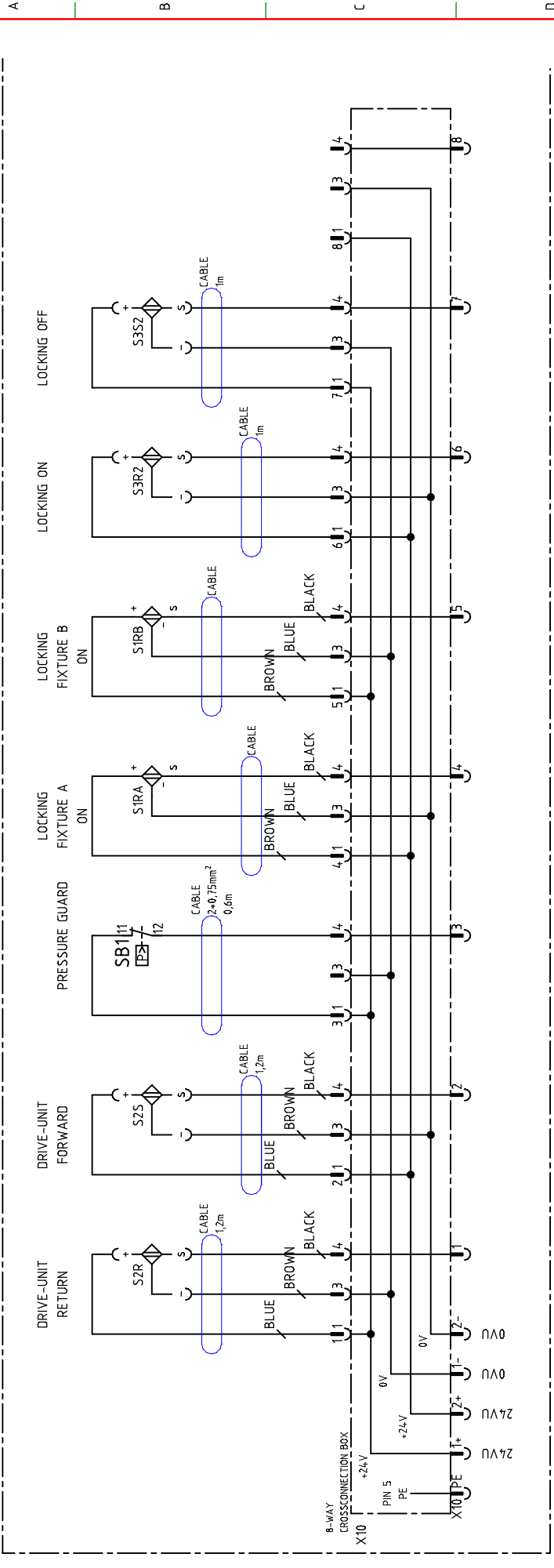
  

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Ritn.-nr./Dwg.No.	PAGE
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347358-97

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RM2-500/750SX



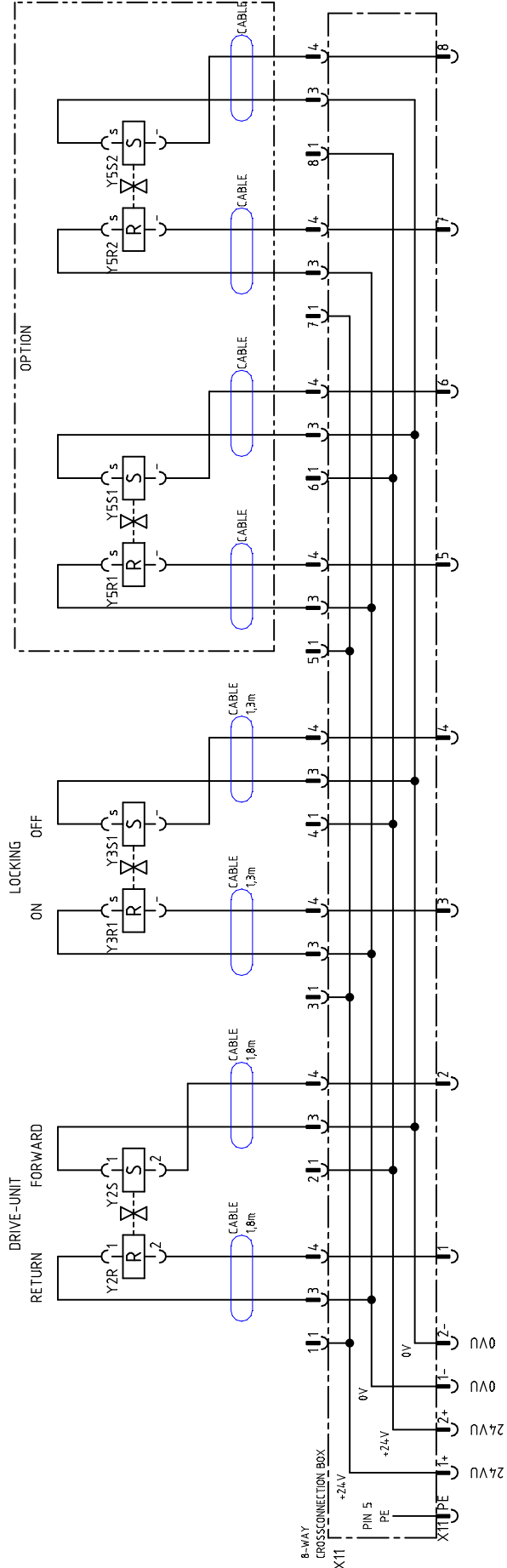
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REVISION	REV	REVISION
SIGN	SE	SIGN
GODK	GODK	GODK
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RM2-500/750SX USA VERSION		
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RM2-500/750SX



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Kabelarea	0,75mm <sup>2</sup>	om ej annat anges.
Kabeltyp	Ölflex	om ej annat anges.

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F	CABLE TO CROSSCONNECTION BOX X10 & X11 REMOVED	SE	011204
SE		SIGN	GODK

MOTOMAN SWEDEN		KUND/CUSTOMER	
DR. DRAWN	SE	CONSTR. DESIGN	MM
GODK. APPR.	DATE	000323	REV

RM2-500/750SX USA VERSION			
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FORMS BL. N. PAGE	D03	BLAD	PAGE
Ritn.-nr./Dwg.No.	E347358-97.PRO		

347358-97			
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Tápiószele, Jászberényi út 4., H-2766, Hungary  
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